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PRUNING AND TRAINING

PEACH ORCHARDS.

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PRUNING AND TRAINING PEACH ORCHARDS.

R. H. PRICE.

The peach is the most important fruit grown in Texas. The general outlook for peach growing in the State is promising. Large orchards are now being set in the northern and eastern parts of the State. To those who are setting new orchards, the subject of correct pruning and training will appeal with special force. The application of correct principles of pruning to old orchards will often be of great benefit also.

Pruning is the operation of taking off undesirable parts. Training is directing the growth of succeeding branches. The idea of correct training should come before successful pruning. We prune in order to train a tree according to some preconceived ideal of form. We also prune, less frequently, to remove dead wood and to thin the fruit. Hence, a correct ideal of the best form of top for any given locality is of the greatest importance to successful peach culture. The form of top should be decided upon before the orchard is set and be strictly adhered to afterwards. No one should prune a peach tree without fully understanding the necessity of the operation and also what results such an operation of surgery would have upon the future growth of the tree. The best form of top for a given locality is not an easy thing to decide upon. There are several factors that enter into the problem and affect the growth of trees very materially. Moisture of the soil, fertility, altitude, latitude, aspect and variety should be considered in deciding upon the best form of top. It must not be understood, however, that there are no certain and well established principles that underlie all successful pruning of each species of fruit trees, irrespective of environment. These principles we hope to bring out in this bulletin in reference to the peach together with their correct application in this locality. If the principles of peach pruning are understood, together with the effects of environment upon growth and development of a peach tree, it ought not be a difficult thing to decide upon the best ideal to follow in any part of the State or of the United States. Nearly all the ugly and poorly formed tops of peach orchards are largely due either to neglect or to training to some ideal almost wholly unsuited to the natural habit of the trees. Such orchards are often failures. It is scarcely necessary to add that the mechanic is not the one to use the knife or saw in the orchard. We do not send for a dentist when we have fever.

HOW PEACHES ARE BORNE.

Peaches develop from buds that are formed the previous year, and nearly all of them occur on the previous year's growth of wood. Hence,

nearly all the peach crop can be destroyed by heavily pruning back the young branches after growth for the year is completed. We can take advantage of this fact when pruning the peach tree and thin the fruit at the same operation. Sometimes a late frost might come and destroy another large per cent. of the fruit buds, thus lessening the fruit crop to an undue proportion. Where late frosts are liable to occur and the orchards are small so that they can be pruned in a short time, it may be advisable not to prune off the young limbs until after the fruit crop is set.

If the ends of the limbs are not headed back the fruit will be borne further away from the trunk of the tree each succeeding year. The limbs will become long and angling. The weight of the fruit on the ends of the long limbs will cause them to droop and frequently break or split off. If the fruit is not thinned off from them, many varieties will overbear one year and so exhaust the trees that they are not apt to bear the next year. Such orchards are liable to fruit every other year. During the heavy fruit year, an overloaded tree will make but little wood growth on which to bear the following year.

Heading back the ends of the young limbs accomplishes several important things: (1.) It enables the tree to make new bearing wood for next year; (2.) It thins the fruit; (3.) It lessens the liability of splitting and breaking of the limbs by making them more stocky; (4.) The fruit is borne near the ground where it is easier to gather and (5.) It keeps the bearing wood nearer the main trunk by causing side branches to come out on the main limbs.

HEALING OF THE WOUNDS.

As a rule, limbs should be cut off rather late in winter so that the cut places will not be exposed so long to the weather before healing commences in the spring. The stubs should be short, so that the cut places will soon heal over and not leave a dead and decaying surface exposed to the weather so long. The body of the tree might become affected from the diseased stub. Make the surface of the wound smooth. Do not bruise the bark near it. Side branches should be cut off just at the outer edge of the collar, making the surface of the wound parallel with the limb from which the branch is severed. Healing over of the wound will then begin with the "first intention."

The ends of limbs should be cut off just above a strong bud where the activity of growth is most manifest. If it is desired to spread the tree more, leave the last bud next to the cut place on the far side of the limb and rub the next lower inner bud off. If it is desired to bring the top in more, leave the last bud on the near side of the limb and rub off the next lower bud on the far side. If two or more branches are desired to grow out, leave all the buds on near the cut place. These points are not so very important in pruning old trees, but they are very important in starting the tops of young trees correctly. A coating of white lead paint on the surface of wounds keeps out water and disease germs and should be applied on all wounds of much size.

INFLUENCE OF ENVIRONMENT UPON PEACH GROWTH.

On low, rich, moist soils, tree growth is most rapid and vigorous. Trees grown upon such soils should be headed higher than those grown upon a rather dry, light soil. Trees grown in States further north should have also a higher top than those grown in the southern States bordering on the gulf. Where trees grow vigorously more pruning back is necessary in order to keep them in proper bounds.

In deciding upon the correct form of top for peach orchards, it is a good idea to observe the form of tree growth in forests growing near by. On the uplands in this latitude, for instance, trees in the forest make their tops very low and bushy. It would evidently be following the true principles of nature in this latitude to start the tops of peach trees very low and train the branches to a short stocky growth. Another good way to determine the best form of top to train a peach tree to, is to grow a few peach trees out in the open by themselves without any pruning to see how nature starts and forms the tops. By following these two lines of observation, one cannot go far wrong in forming a correct ideal as to the best form of top naturally suited to the tree, for each species and variety in any locality.

Some have asked the question, "why prune at all?" "Why not let nature take its full course with peach orchards?" In the first place, nature continually prunes her trees. She throws off foliage when drouth comes and increases it when the rainy season comes during the period of growth. There is a constant struggle going on among the different branches of the same top. The form of top that the tree makes is the result of this struggle, as will be shown further on. The different branches growing out from an upright limb of a tree in the top are nearly always grown from the far side of the limb. Nature has pruned off those limbs from the inside by shading them. A very casual glance at

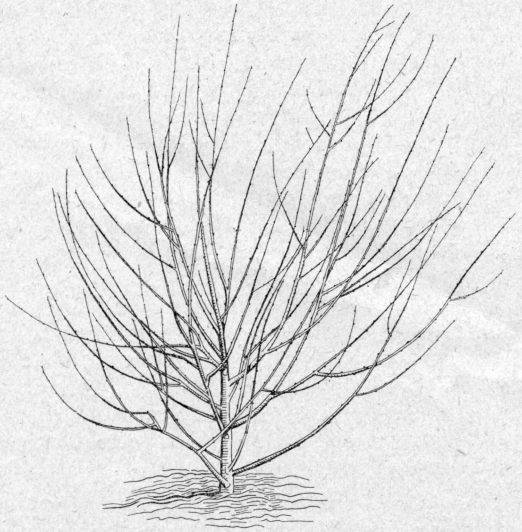

FIG. No. 1.—*Tree as it grew the first year by itself and without pruning.*

the top of a peach tree will soon convince one of this fact. While the natural tendency of the top is to grow upwards, still, many of the branches have to spread out so that the foliage will get the proper amount of sunshine and air. These limbs, if let alone, would grow out too far for our purposes. The fruit would not get enough sunlight to be well colored. Figure No. 1 shows a peach tree that has had one year's growth on our grounds without any pruning. It will be seen that the top was formed near the ground. The tree has made a low bushy growth. We have grown a number of peach trees here for several years by themselves and without any pruning, and they maintained this form of top during their entire growth. Hence, we have adopted this form of top in our orchards here during the past eight years and with very satisfactory results. Since our orchards came into bearing, we have not failed in a single peach crop. Of course, not all of this was due to the method of training. Some of it was due to the varieties planted and to the methods of culture followed.

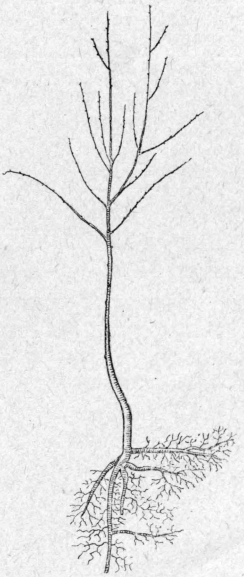

FIG. No. 2.—*Young tree as it came from the nursery.*

In figure No. 2 is shown a peach tree bought from a large nursery in the State during the fall of 1900. It is an average peach tree as it comes to the grower from the nursery. It is long and slender with only a few limbs near the top. The lower side branches were all crowded out by the trees that grew close by the side of it. This form of top is the result of the struggle for light between this tree and the others that grew near by. If planted out in the orchard with this form of top, nature would at once cause the tree to throw out side branches lower down to shade the trunk. The tree would begin to assume the form of top best suited to it in this latitude as shown in figure No. 1. The topmost branches on such a tree when set out would grow but little for several years, if at all in this latitude. The crown of the tree would be started at no definite place.

The limbs would likely be scattered all along up the trunk. The growth of limbs would likely be uneven and it would be difficult to make the top assume a desirable form afterwards. Hence we cut the top back to about 18 inches when it is set in this latitude, as shown in figure No. 3. If

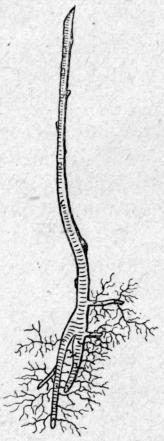

FIG. NO. 3.—*Tree pruned and ready for the orchard.*

the tree is two years old, or is an overgrown one-year-old tree, the side buds are so latent that the branches may come out irregularly. This form can usually be corrected by pruning properly afterwards. The difficulty is not likely to be met with if one-year-old, rather small trees are selected. They are decidedly preferable for general orchard planting. It is a great mistake to select the largest and tallest trees for orchard planting. If the growers would request the nurserymen to prune off

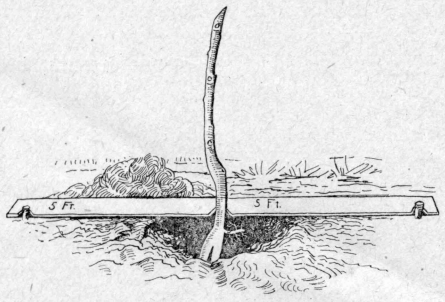

FIG. 4.—*Young tree being set in the orchard.*

at least half the tops before shipping, it would be a great saving of wrapping material and cost of transportation.

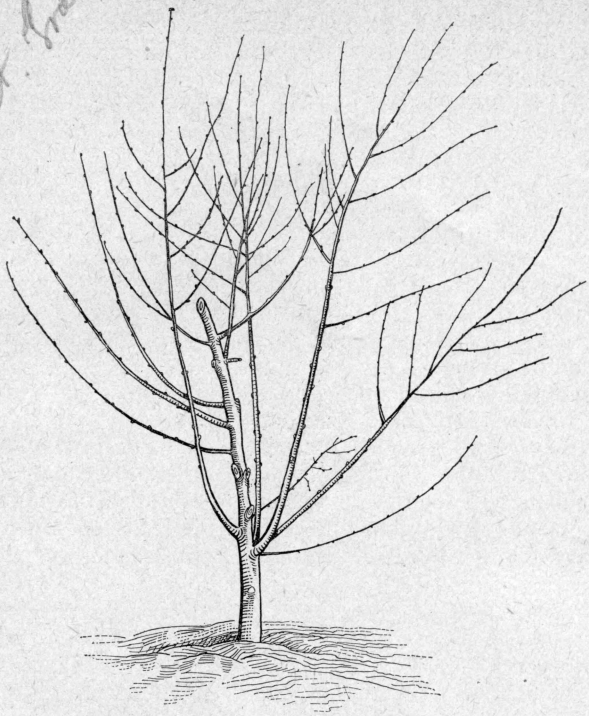

FIG. NO. 5.—*First year's growth.*

In figure No. 5 is shown a tree after one year's growth. It has made a rather undesirable top. It was a large one-year tree when set out here in our orchards. There is ample room, however, for a wise choice in selecting the place for the crown on this tree. The lower limbs have made much more vigorous growth than the upper ones. This fact would induce me to select the point for the crown on this tree as low down as possible.

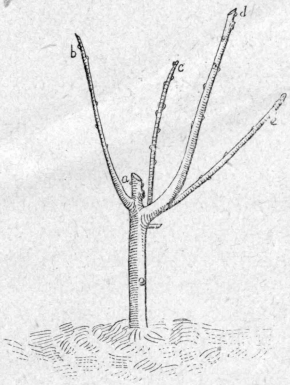

FIG. NO. 6.—*Pruned after first year's growth.*

In figure No. 6 is shown the same tree after pruning. The limbs will throw out many side branches next year, because they are not shaded by other limbs above them. Branches on the left of the tree at "a" are apt to make the most rapid growth since they will not be shaded much by any other limbs near them. There will be the last struggle for existence at this point.

To the amateur, this severe pruning of the young tree may seem hazardous. It might be stated that much of this pruning might be avoided even on general nursery stock, if care be taken to follow up summer pinching closely. Undesirable limbs could be pinched back and the more desirable ones encouraged in growth thereby. This is a most commendable practice wherever it can be carried out, but in large orchards the time is usually not found for such close personal attention during the period of growth.

The peach tree will stand an immense amount of pruning with impunity. In fact, I know of no other tree that will stand it so well. While the young tree may have its branches severely cut back in the spring in order to form a correct top, the roots have made good development and lusty growing shoots will soon come out and re-establish the equilibrium between the top and root systems that books tell us so much about. A correct form of top is the correct thing to fruit bearing and longevity

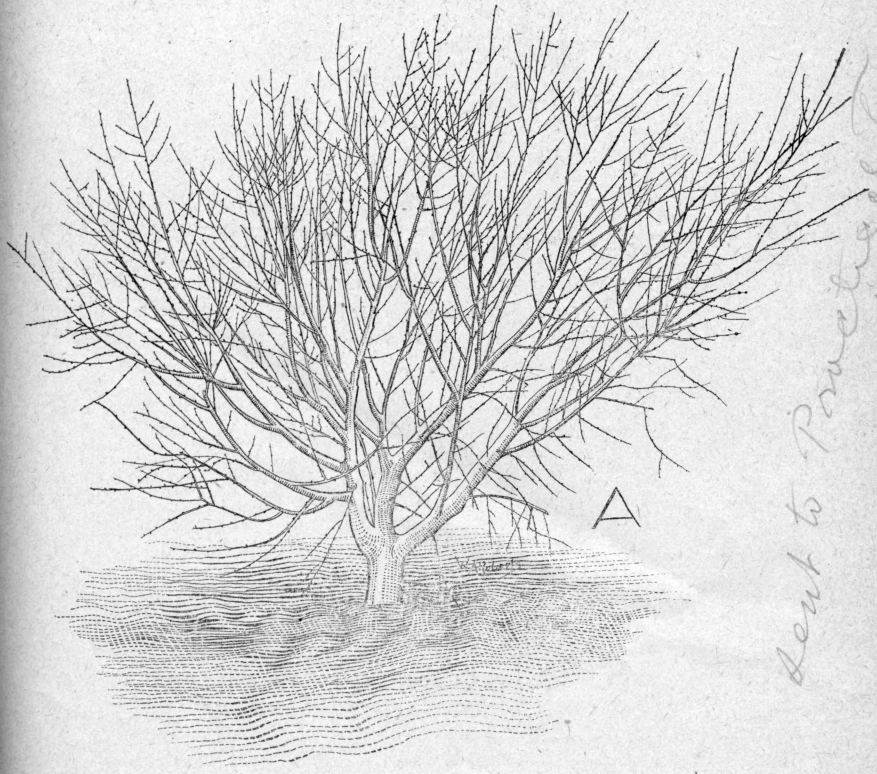

FIG. NO. 7.—*Three year old tree in the Station orchard.*

of the tree. If the opportunity is lost to obtain this desirable form of top in the early growth of the trees it is forever lost for that tree.

Pruning the second and third years is done on the same principles as for the first year. During these early stages in the growth of the tree the ideal should be kept constantly in mind while pruning, so that the tree would have as wide spreading top as possible in order that a large area of leaf surface might be exposed to the sunshine and atmosphere, thus enabling the tree to carry a heavy load of large and highly colored fruit.

In figure No. 7 is shown an average three-year-old tree of General Lee variety, as grown in our orchard. It is a general type of tree found in all our peach orchards where three consecutive crops of peaches have been borne without scarcely a single limb being broken by an overload of fruit, nor has a ladder been found necessary in gathering the fruit.

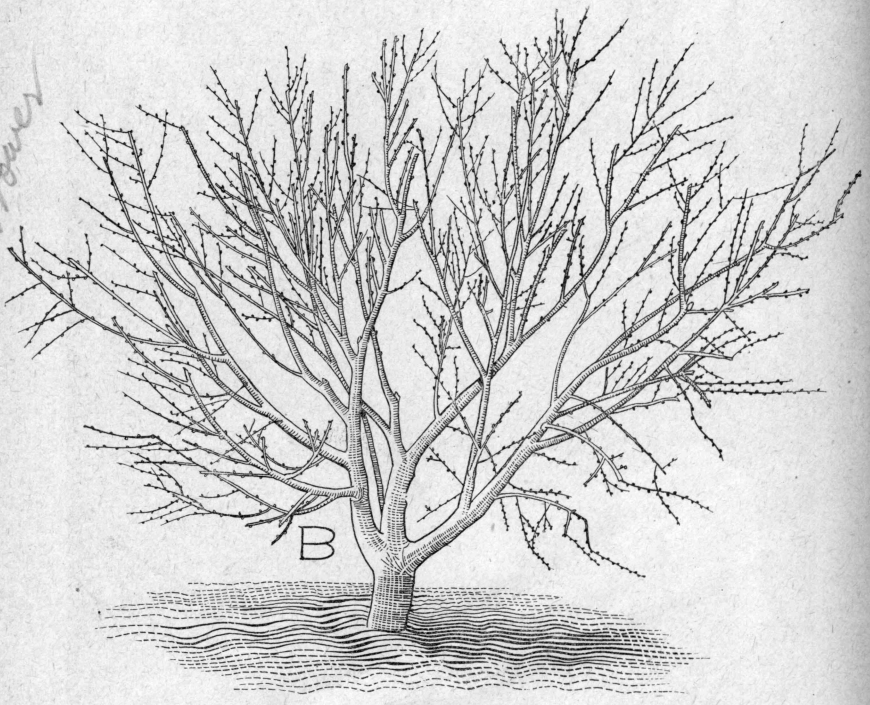

FIG. No. 8.—*Same tree shown in Figure 7, after pruning.*

In figure No. 8 is shown the same figure after pruning. This tree is now able to bear at least three bushels of fine fruit, and, in all probability, this quantity will be gathered from it next season. About half the fruit bearing wood has been cut away. It pays much better to produce one large, fine peach than it does to produce two small, inferior ones. This tree will make ample wood growth for the succeeding year's fruitage. The low top will not be in the way of cultivation any more than the one shown in figure No. 12 that was pruned up high and the limbs droop near the ground. The grass and weeds that grow under such

low headed trees have given us but little trouble. By use of the extension disc harrow the trees can be cultivated up to closely as necessary. Strong winds will not have such leverage on the top of this tree as to bend it over or shake the fruit off. The trunk of the tree is so well shaded by its own limbs that there is scarcely any liability of sun scald so frequently found in orchards of the Western States.

A man can stand on the ground and gather every peach from this tree. The broadly spreading top gives a large area for expansion of the foliage.

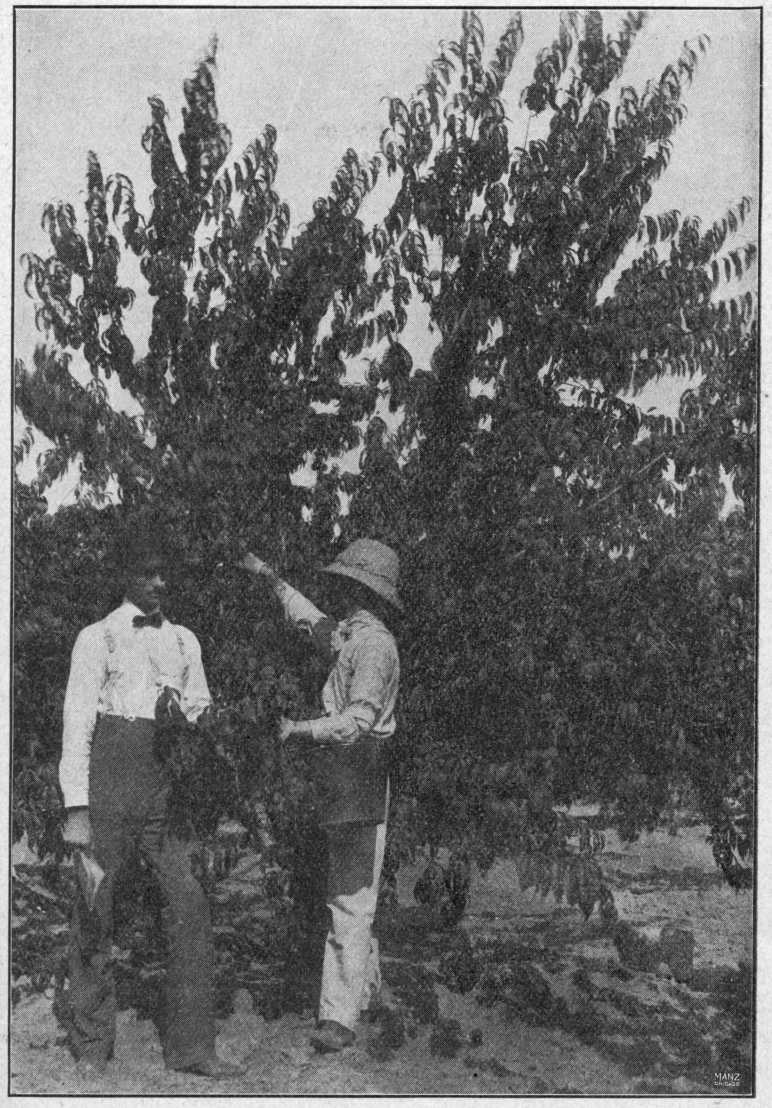

FIG. NO. 9.—*Peaches being gathered from four year old tree in Station orchard.*

The fruit will be large and of fine color. The limbs will need no props nor will they break nor split off. We will not be troubled by continuous pruning of water sprouts from the trunk. The top is formed at the place best suited to the natural growth of the tree in this latitude and no energy of the tree will be wasted in trying to form the present top. If spraying should be found necessary it will not be difficult to do. Of course if stock be allowed to run loose in orchards with such low headed tops more damage would be done to these trees than to those of higher tops. We have not yet reached the period when it is advisable to grow fruit for stock nor plant peach orchards for grazing purposes. Such purposes are not germane to the subject. However, it is a practice with some orchardists to turn a few hogs into the orchard to gather up "wormy and diseased fruit." For such purposes small hogs are not likely to injure the trees and may often do valuable work in this respect. It is not best to encourage large limbs to grow out from the trunk directly opposite each other, especially with larger growing trees like the apple, since they are more liable to split off. The trunk is stronger when the limbs come out at different places, but with low headed trees and short, heavy limbs no damage is likely to be done by splitting to low growing trees similar to the peach.

SOME DEFINITE RESULTS OF HIGH HEADING.

In obtaining these results we have not only taken examples from our own orchards in this latitude, but have also taken examples from orchards eleven hundred miles further north at an elevation of four thousand feet, where the soil is quite rich and moist. All the illustrations given in this bulletin have been taken from trees as they grew in our own orchards, except where otherwise stated.

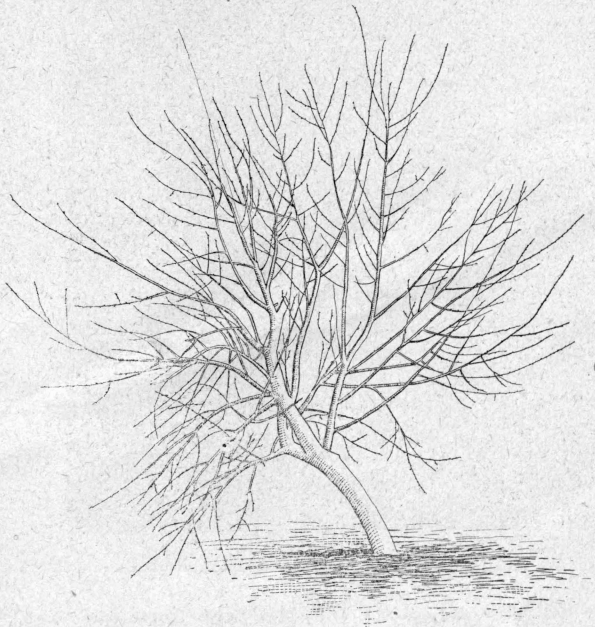

FIG. No. 10.—*High topped tree bent over by storm.*

In figure No. 10 is shown a two-year-old Victor peach tree bent over by storm while the soil was moist. The tree is trying to right itself by throwing out strong upright limbs. The trunk is left unshaded on the far side of the curved trunk, and is liable to sun scald. The tree was two years old when it came from the nursery, and the top had been formed three feet above the ground, and was left as it was, with the exception of pruning back the limbs when set. The buds on the lower part of the trunk of this two-year-old tree were so latent that they were not forced out. This form of top would easily be classed here as an undesirable one.

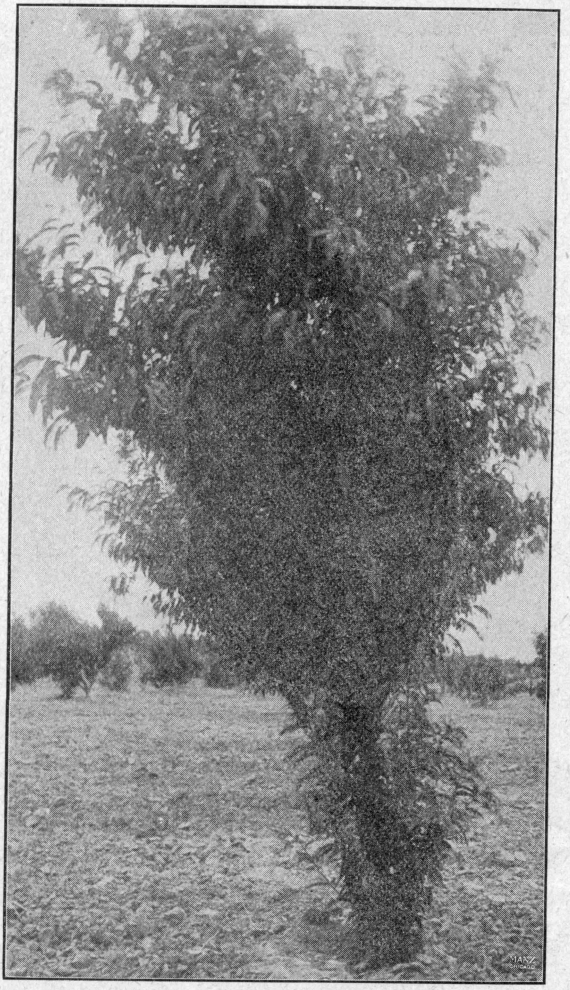

FIG. No. 11.—*Water sprouts shading trunk.—Pruned too high.*

In figure No. 11 is shown a tree that has been pruned up too high for two years, and many water sprouts are being thrown out lower down to

shade the trunk and conform more nearly to the natural habit of the tree in this latitude. By continuously pruning off these water sprouts is largely a waste of energy of the tree and of the man, and continuous pruning will be found necessary to keep them off in this locality. This form of top has many objections that could easily be stated.

FIG. No. 12.—*Headed back, but pruned too high.*

In figure No. 12 is shown another tree pruned very high. The top branches that remain are properly cut back. The tree is just beginning to throw out a large number of water sprouts lower down on the trunk. Mistakes were made by pruning off the limbs a, b, c, d, e and f. This form of top is also very undesirable. But little bearing wood has been left.

FIG. No. 13.—*Effects of fruit on ends of long limbs.*

Figure No. 13 shows a tree with top formed very high. The drawing was made from a photograph of an Indian peach tree growing in an orchard on the north side of the Alleghany Mountains in Southwest Virginia. The trees stood very closely together on a rich, moist soil; consequently, no water sprouts were being thrown out lower down on the trunk. The tree was bearing its first crop of fruit, which was a very heavy one. The limbs had to be propped up to keep them from splitting and breaking off. Scarcely any bearing wood for next year was being formed. The fruit was extremely small and of inferior flavor. Scarcely any fruit can be expected from this tree next year. The ends of the limbs were not headed in nor was the fruit thinned. A ladder was necessary to gather much of the fruit. A heavy storm would have blown off much of the fruit and almost ruined the orchard. The high headed top was not so objectionable in this peculiar situation as the long angling, drooping limbs. This form of tree is as difficult to cultivate under, without injury to the tree, as a properly formed low topped tree.

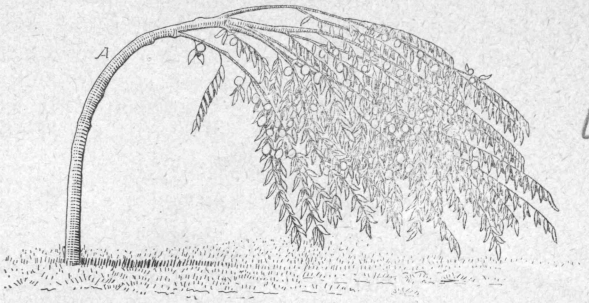

FIG. No. 14.—*Tree bent over by fruit.*

Figure No. 14 shows a tree in the same orchard, with the top formed extremely high. The top of the tree was bent over till it nearly touched the ground. If left alone the tree is practically ruined. The faults of this system of training need no comment; they are self-evident.

FIG. No. 15.—*Effects of sun scald on unshaded trunk.*

Figure No. 15 shows a tree in our orchard ruined by sun scald. The trunk was exposed to the hot sun, and when a sudden freeze came in March, after the sap had been active, the bark split lengthwise of the tree during the following summer, and exposed an ugly wound on the southwest side of the trunk. All trees affected this way are practically ruined.

ROOT PRUNING.

This bulletin would hardly be complete without some remarks on the so-called root pruning theory, commonly known as the "Stringfellow Method." There has been considerable literature written upon this subject during the past few years, and much of it published in the State has been a controversial style, containing many personalities. A number of experiments have been carried on in different parts of the United States to test this method.

In Bulletin No. 39, published July, 1896, the results of our tests are reported. Before going into the discussion of the merits of the theory it might be well to call attention to some facts bearing on its correctness.

After careful observation of peach, plum, pear and apple trees that have been grown here and were pruned according to Mr. Stringfellow's instructions, I am thoroughly convinced that the so-called "Stringfellow root pruning theory" is not based upon sound physiological principles. For instance, new roots seldom grow out from the callous formed on the surface exposed by cutting off an older root. They grow out from all parts of the area of the root surface, especially from that of the younger roots. It is well known that new roots nearly always grow out from the callous of a cutting, but the cutting is quite a different thing from that of a tree, in that it has no root surface. As to whether new roots will grow downward or laterally does not depend at all upon the way older roots are pruned. Their direction of growth does depend upon the natural habit of the tree, the mechanical condition of the soil, its fertility and moisture. Nearly all trees that naturally have tap roots in their early periods of growth cease to grow tap roots after being well established. When the main tap root is cut off and the tree reset, it will usually develop one or more new tap roots, irrespective of the way it was pruned. This fact is well known. It might be well to state, however, that under favorable conditions we have grown good peach trees when root pruned as Mr. Stringfellow recommends. Good results are also reported from Mr. Hale's large peach orchards of Georgia, as well as from the Georgia Experiment Station. It is well known that the peach will stand severe pruning both of roots and top with impunity. The method has local value, and wherever conditions are favorable, and it is proved satisfactory from experiment, it ought to be followed, but the system is not based upon sound physiological principles susceptible of wide application.

As stated in our Bulletin No. 39, a considerable portion of tops and roots could be pruned off by the nurserymen with profit before shipment of general nursery stock. The following quotations bearing upon the subject may be of interest:

SOME RESULTS OF EXPERIMENT STATIONS.

"Without drawing positive and definite conclusions, it seems evident, so far as this soil and climate are concerned, that severe top and root pruning are not advisable in this climate." Bull. 39, p. 836, Tex. Expt. Sta.

"The method is a practice with local merit rather than a system that is founded on sound principles of plant growth. The advocates have based their claims on a succession of misconceptions of the laws of plant development. The stub pruning method seems to be meritorious chiefly from the economic advantage of handling and planting the trees, and wherever its value in a given locality is determined by experimental efforts, it would seem a wise policy to adopt it. Under the conditions in which it has been studied in Delaware it has not succeeded, neither have the long rooted trees behaved as well as those with roots of medium length.

"The emphatic value of the so-called system is in the study it has awakened concerning the principles of root development." Bull. 45, p. 16, Del. Expt. Sta.

"Stub-root pruning is to be considered a matter of local practice, not a matter of general principles. The practice may be good and it may not. The explanation or assumed theory is wrong. It will probably be found to be best adapted to the South, where plants grow from cuttings more readily than in the North; and the nature of the land as respects texture and the nearness of the water table will probably influence the result. The kind of tree may also be important." The Pruning Book, p. 249, L. H. Bailey.

"The writer is fairly satisfied that peach trees pruned by the Stringfellow method will live and flourish in this section in stiff clay soil under adverse metereological conditions. This statement may also be extended to apples and cherries. That all trees so treated will thrive equally well in all localities he is by no means prepared to admit." Bull. 40, p. 179, Ga. Expt. Sta.

"The more healthy roots left on a tree at planting time the better is likely to be the growth. Making a fresh clean cut at the ends of the roots when planting appears to afford no advantage, provided the root is sound where cut in the nursery. Trees planted with no root pruning now average decidedly larger than those which had the roots shortened, leaving a fresh cut." Bull. 56., p. 24, Neb. Expt. Sta.

"Certainly so far no increased vigor has been observed in the root pruned trees; but on the other hand, no disadvantage can be detected, and the conditions could hardly have been more severe." Bull. 98, p. 271, Ala. Expt. Sta.

All the drawings shown in this bulletin were made by Mr. W. A. Roberts, under the direction of the author.